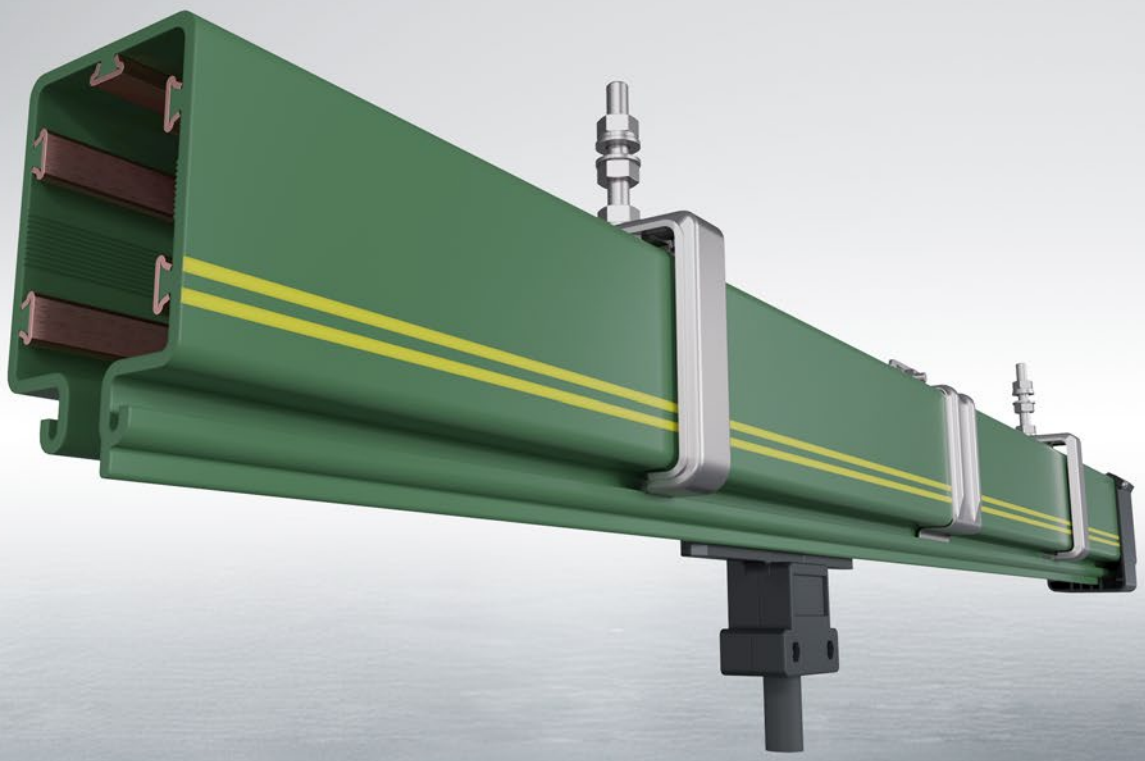
VAHLE

KSL | KBSL

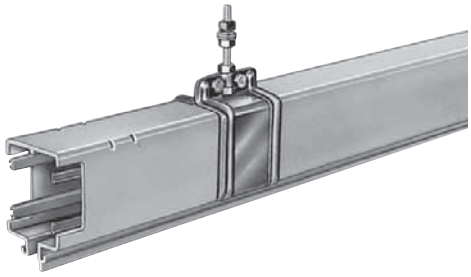
ENCLOSED CONDUCTOR SYSTEMS



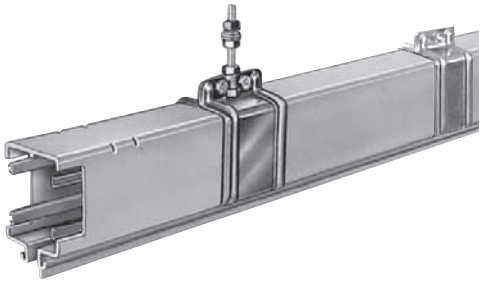
4A | EN 2010

POWERAILS KBSL – KSL

Powerail versions (drawings see page 5).



Type KBSL[1]
color: green



Type KSL
color: green

General

The Powerail types KBSL and KSL are totally enclosed, touch-proven conductor systems for safe mobile power feeding of: Overhead Cranes, Monorail Systems, Electric Hoists, Automated Storage and Retrieval Systems, Electric Power Tools, Machine Tools, Assembly and Test Lines, Hanger Door Motors, Studio & Station Lighting
Systems and many other applications.

Main characteristics are minimum space requirement, easy installation and resistance against corrosion.

VAHLE Powerails fully meet all VDE safety requirements.

Other cross sections, as shown on page 5, are possible. The upper pole is used as N-conductor if required. The max. copper cross section of the conductor is 25 sqmm.

If the cross section of the N-conductor is smaller than the cross section of the outer conductor, it is nescessary to protect it against overcurrent and short-cirtcuit, design according to IEC60364-4-43 (HD 60364-4-43).

Apporovals

KSL: UL-approved, CSA-approved.
Please contact us before ordering.

Housing

The compact insulating housing holds from 4-5 pure copper conductors. Suitable for indoor applications.
Standard sections are 1, 2, 3 or 4 m long.
Other sections and curves are available.
Type KSL is equipped with stiffener clamps.
The ground conductor is identified by international color code. Long and short lip housing profiles (see page 6) and collector safety keys avoid phase reversing.
Any number of conductors can be accomplished by installing various Powerails side by side.

[1] KBSL is w/o stiffener clamps.
KSL will be equipped with stiffener clamps.

Couplings:

The KBSL and KSL can be supplied from 40 - 100 A alternatively with bolted joints or plug-in joints. With 140 and 200 A bolted joints are always needed. The sections for plug-in and bolted joints are identically constructed.

Joint cover

The housing of the Powerail types KBSL and KSL are connected by plastic joint covers.

Main power supply:

The Powerail systems can be fed either by line feeds or end feeds.

End caps:

The open ends of Powerail are closed by end caps.

Hangers:

Bracket at the crane track (see page 8).
Max. support distance with the following ambient temperatures of the conductor:

≤ 35° C = 2,00 m

> 35° C = 1,33 m

Expansion during temperature fluctuation:

The extensions can be compensated for the KBSL and KSL by expansion joint sections (without electrical separation).

Anti-condensation sections:

These sections are used for transfer of the Powerail to outdoor areas to avoid condensation. The Powerail is not separated electrically.

Contact sections, turntables and switches:

Powerail for working areas and transfer applications see page 12.

Sectionalizing:

Conductor dead sections are electrical interrupts of the conductor. Under normal operating conditions a cross over with collectors to switch the voltage off or on is only allowed with low power ratings (control current).

Available in air gap version (5mm), where the collector carbon bridges the gap, e.g. for mains.

Also available in insulating piece version (30 mm). In this case the insulating piece is longer than the carbon and each Powerail section can be separated electrically, e.g. for control.

Collector:

The current collectors are made of re-inforced polyester, for high strength and light weight. Spring loaded carbon brushes maintain uniform contact. Connecting cables or terminal boxes and hinged or flexible towing arms included.

With following system requirements double collectors have to be used:

- Transfers with switches and turntables
- low voltages, frequency controlled drives
- Transmission of data- and/or emergency stop signals
- high electrical loads

The length of the collector cable may not exceed 3 m if the added overcurrent protection device is not designed for the load capacity of this cable. Please refer also to regulations VDE 0100, part 430 and EN 60204-32.

(Note: this might happen in case of several collector running in one system).

The connecting cables are sufficiently dimensioned for the indicated continuous current ratings.

Consider reduction factors for different kinds of installation as per VDE 0298-4.
Please note: For use in galvanizing and pickling plants, under agressive conditions and low voltage applications we would appreciate receiving detailled information, especially of the environmental conditions. For quotations and order processing including Powerail systems with curves, dead sections, turntables, switches etc. we require your drawings or sketches. Please use our questionnaire, page 25/26.

All steel parts and hardware of Powerails can be supplied in stainless steel version (version K)

Technical Data of Powerail KBSL · KSL

Electrical properties:

Ampacity	200 A (at 80% ED)	
Nennspannung(UL)	690 V (600 V)	
Dielectric strength	IEC 60243-1-3	30–40 kV/mm
Specific resistance	IEC 60093	5 x 10^{15} Ohm/cm
Surface resistance	IEC 60093	10^{13} Ohm
Leakage resistance	IEC 60112	CTI 600–2,7

Mechanical properties:

Flexible strength	75 N/mm² ± 10 %
Tensile strength	40 N/mm² ± 10 %
Temperature range (ambient):	– 30 °C to + 60 °C

Flame test proof:
no flaming particles, self extinguishing — DIN 41 02 – Class B 1 Part 1

Housing Resistance to chemicals: at + 45 °C

Gasoline	Sulphuric acid 50 %
Mineral Oil	Caustic soda 25 % & 50 %
Grease	Hydro-chloric acid, concentrated

Consider the voltage drop calculation to maintain the limits established by the motor manufacturers:

AC: $\Delta U = \sqrt{3} \times I \times l \times Z$

DC: $\Delta U_1 = 2l \times I \times R$

$$\Delta U_2 = \frac{\Delta U_1 \cdot 100}{V}$$

ΔU_1 = Voltage drop [V]
ΔU_2 = Voltage drop [%]
I = Ampere load [A]
R = Resistence [Ohm/m]
l = Power feed length [m]
L = System length [m]

Effective length:

$l = L$ power feed located at the end of the system
$l = L/2$ power feed located at the mid-point of the system
$l = L/4$ power feed located at both ends of the system
$l = L/6$ power feed located at L/6 from each end of the system

Z = Impedance Ohm/1000 m
V = Voltage rating [V]

The total ampere load is determined from the nominal rated current of all motors working simultaneously on the same feed section of your electrification system. A diversity factor of 0.5 – 0.9 can be considered.
The conductor size and/or number of feed points should be increased or booster cables should be used in parallel in case the drop is exceeding the limitations.

POWERAIL TYPES, ENGINEERING DATA AND CAT.-NOS.

Type[1] **HS** c/w PE **SS** w/o PE		No. of Conductors	Continuous current A at 35 °C and 100% ED Phase	Copper cross srction mm^2 L1 L2 L3	⏚	N/5[3]	Control line	Nominal voltage [4] V	Leakage distance mm
KBSL 4/ 40 ... HS		4	40	10	10	-	-	690	30
KBSL 4/ 40 ... SS	control line	4	40	-	-	-	10	690	30
KBSL 4/ 60 ... HS		4	60	15	15	-	-	690	30
KSBL 4/ 60 ... SS	control line	4	60	-	-	-	15	690	30
KBSL 4/100 ... HS		4	100	25	25	-	-	690	30
KBSL 4/140 ... HS		4	140	35	35	-	-	690	30
KBSL 4/200 ... HS		4	200[2]	50	50	-	-	690	30
KBSL 5/ 40 ... HS		5	40	10	10	10	-	690	30
KBSL 5/ 40 ... SS	control line	5	40	-	-	-	10	690	30
KBSL 5/ 60 ... HS		5	60	15	15	15	-	690	30
KBSL 5/ 60 ... SS	control line	5	60	-	-	-	15	690	30
KBSL 5/100 ... HS		5	100	25	25	25	-	690	30
KBSL 5/140 ... HS		5	140	35	35	25	-	690	30
KBSL 5/200 ... HS		5	200[2]	50	50	25	-	690	30
KSL 4/ 40 ... HS		4	40	10	10	-	-	690	30
KSL 4/ 40 ... SS	control line	4	40	-	-	-	10	690	30
KSL 4/ 60 ... HS		4	60	15	15	-	-	690	30
KSL 4/ 60 ... SS	control line	4	60	-	-	-	15	690	30
KSL 4/100 ... HS		4	100	25	25	-	-	690	30
KSL 4/140 ... HS		4	140	35	35	-	-	690	30
KSL 4/200 ... HS		4	200[2]	50	50	-	-	690	30
KSL 5/ 40 ... HS		5	40	10	10	10	-	690	30
KSL 5/ 40 ... SS	control line	5	40	-	-	-	10	690	30
KSL 5/ 60 ... HS		5	60	15	15	15	-	690	30
KSL 5/ 60 ... SS	control line	5	60	-	-	-	15	690	30
KSL 5/100 ... HS		5	100	25	25	25		690	30
KSL 5/140 ... HS		5	140	35	35	25	-	690	30
KSL 5/200 ... HS		5	200[2]	50	50	25	-	690	30

... Suffix types e.g. 2 m KSL 4/60 with PE ℞ KSL 4/60 - 2 HS Order. - No. 250 002, shorter lengths are made up from the next larger standart lengths.

(1) KBSL is w/o stiffener clamps. KSL and KSG are c/w stiffener clamps (see page 6).

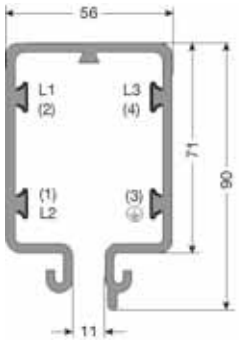
(2) 80% intermittent. ⏚ Ground = PE

(3) Please refer to page 2 for use as N -conductor see page 2.

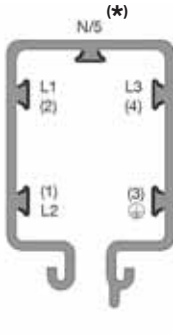
(4) Nominal voltage UL= 600 V

For mounting configurations also see pages 8, 10, 11,13, 14, 20, 23, 25

	Impedance at 50 Hertz 20° C W / 1000 m	Resistance at 20° C W / 1000 m	Weight kg/m	Order-No.	Configurations
	1,81	1,80	1,643	252 96•	
	1,81	1,80	1,643	256 55•	
	1,31	1,28	1,778	253 21•	
	1,31	1,28	1,778	253 25•	
	0,76	0,72	2,134	253 23•	
	0,59	0,53	2,455	252 68•	
	0,38	0,36	3,060	252 69•	
	1,81	1,80	1,734	256 13•	
	1,81	1,80	1,734	256 56•	
	1,31	1,28	1,903	253 22•	
	1,31	1,28	1,903	253 26•	
	0,76	0,72	2,348	253 24•	
	0,59	0,53	2,668	252 70•	
	0,38	0,36	3,274	252 71•	
	1,81	1,80	1,753	257 36•	
	1,81	1,80	1,753	257 64•	
	1,31	1,28	1,888	250 00•	
	1,31	1,28	1,888	251 46•	
	0,76	0,72	2,244	250 01•	
	0,59	0,53	2,565	250 69•	
	0,38	0,36	3,170	254 04•	
	1,81	1,80	1,844	256 93•	
	1,81	1,80	1,844	257 65•	
	1,31	1,28	2,013	250 02•	
	1,31	1,28	2,013	251 47•	
	0,76	0,72	2,458	250 03•	
	0,59	0,53	2,778	250 73•	
	0,38	0,36	3,384	254 05•	



KBSL 4 pole, 40-200 A color green
KSL 4 pole, 40-200 A color green



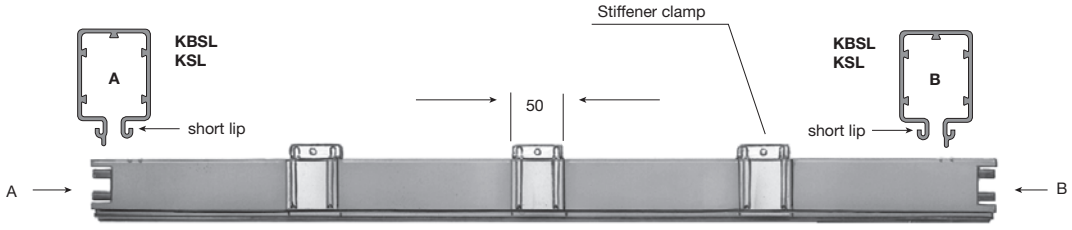
KBSL 5 pole, 40-200 A color green
KSL 5 pole, 40-200 A color green

• Add last number (1, 2, 3, 4 length suffix) in accordance to bars requred.

Description in brackets for control.
(*)In case of using a conductor as N.

STANDARD SECTIONS, CURVES

Sections max. 4 m[1] standard



left

Pic. shows 4000 mm standard section, view on short lip side

right

Extra finish of KBSL and KSL surcharge Cat.-No.:

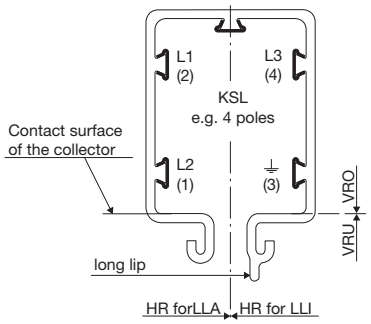
Type	Index K stainless steel clamps & hardware		Index I (60 A) copper conductors with stainless steel cap	
	4-pole	5-pole	4-pole	5-pole
KSL	250 830		258 301	258 302

Index K:
Index I: } for special environmental conditions

Curves[2]

Production corresponding to customer drawing

Support spacing
750 up to max. 2000 mm,
depending on the radius
max. L = 3600 mm,
max. ⊁120°



Minimum bending radius vertical for KSL = 1800 mm

Min. bending radius horizontal in mm

KSL

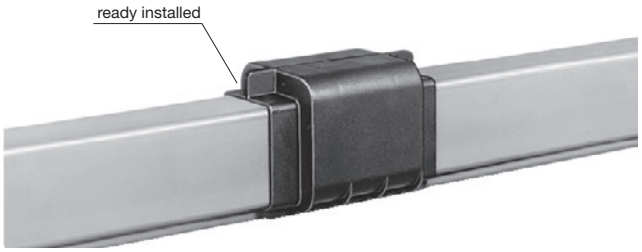
	60 A	100 A	140 A	200 A
4-pole	600	600	900	900
5-pole	750	750	900	900

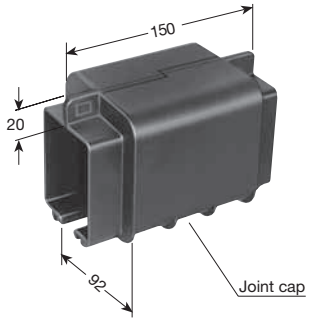
Surcharge 4-pole for bending Order-No.	KSL
horizontal curve	251 500
vertical curve	251 490

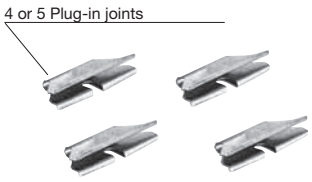
Surcharge 5-pole for bending Order-No.	KSL
horizontal curve	259 424
vertical curve	259 426

[1] Shorter sections see page 4. and 5.
[2] Long lip side of Powerails should always be mounted facing the track (see page 8).
Notify exceptions for replacements and/or extensions and determine correct curves.

Plug-in joints 40-100 A







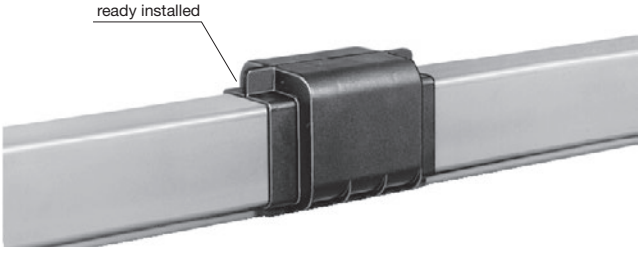
for KBSL & KSL 4 pole

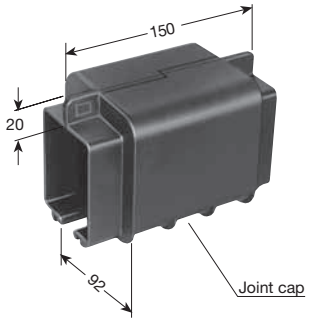
Typ	Weight kg	Cat.- No.
VBK 4	0,215	257 907

for KBSL & KSL 5 pole

Typ	Weight kg	Cat.- No.
VBK 5	0,225	257 908

Bolted joints 40-200 A





for KBSL & KSL 4 pole

Typ	Weight kg	Cat.- No.
VBS 4	0,285	258 818

for KBSL & KSL 5 pole

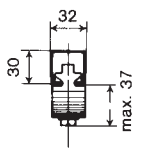
Typ	Weight kg	Cat.- No.
VBS 5	0,310	258 819

(1) Identically constructed for main current and control line

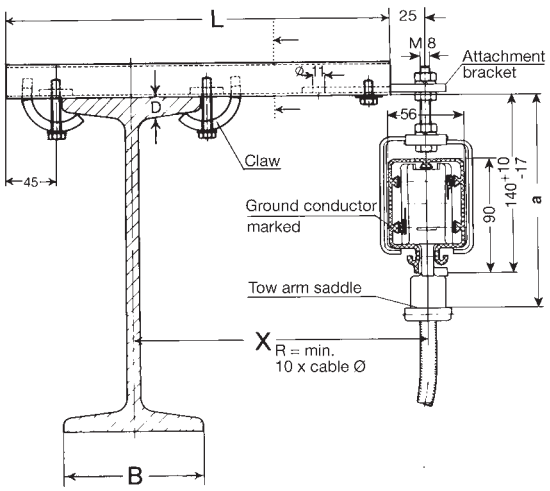
BRACKETS KBSL • KSL

These brackets are easily bolted to any type of standard I-beam.

View without I-beam



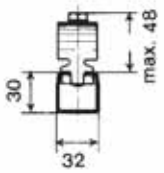
Claw suitable
for D = 6-15 mm



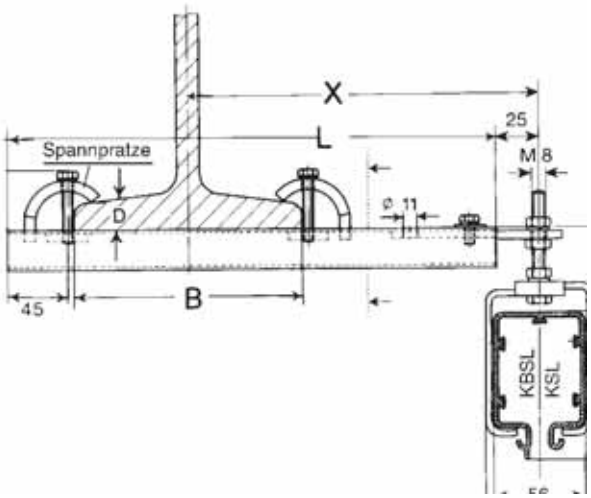
Powerail Type	KBSL – KSL		
Collector	**SKR**	**SKN**	**SKNT**
Dim. a	161^{+7}_{-15}	165^{+7}_{-15}	175^{+7}_{-15}

For KBSL and KSL dimensions "a" also for double collectors.

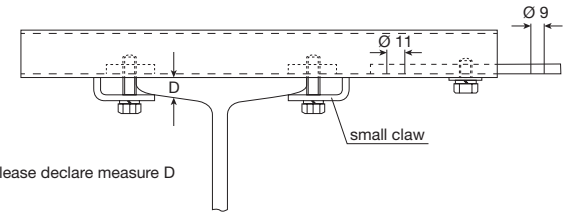
View without I-beam



Claw suitable
for D = 15-25 mm



EHK small claw version



Attention:
Make sure that hoist wheels have enough clearance. Use small claw if necessary. Check I-beam dimension D.

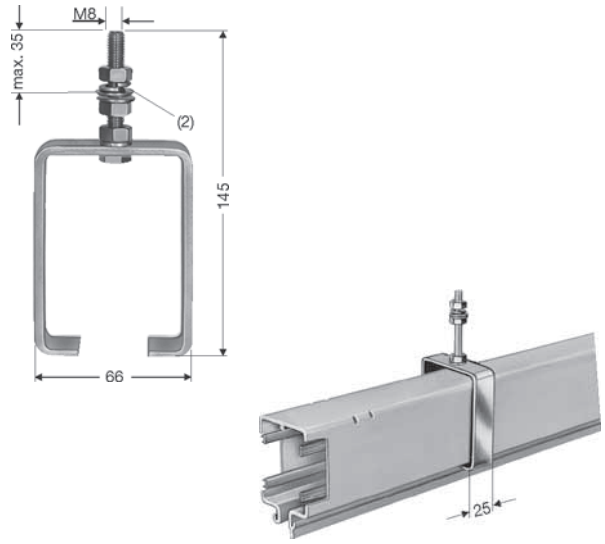
rail of EHK is identical to type S 1, Cat. 8a.

Type	X mm	L mm	B max mm	Weight kg	Order-No. for std.-brackets	Order-No. with small claw
EHK 250	250	350	170	1,070	251 600	251 720
EHK 300	300	400	170	1,150	251 610	251 730
EHK 400	400	500	170	1,300	251 620	251 740
EHK 500	500	600	170	1,450	251 630	251 750
EHK 600	600	700	170	1,600	251 640	251 760
EHK 700	700	800	170	1,750	251 650	251 770
EHK 750	750	850	170	1,820	251 660	251 780
EHK 800	800	900	170	1,900	251 670	251 790

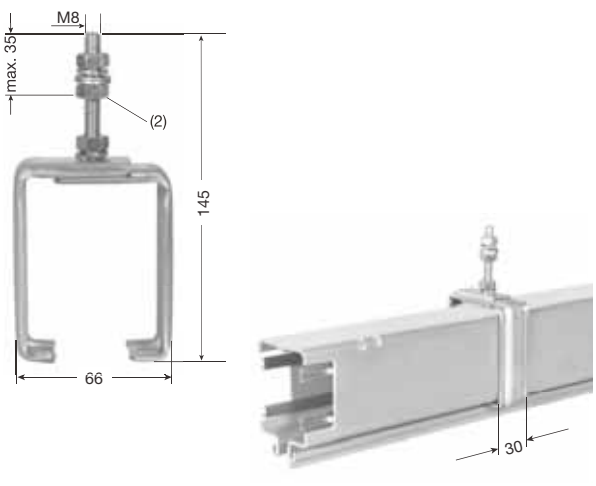
Select next larger size bracket when I-beam dimension B is between 170 mm and 300 mm.

(1) Max. width at joint caps with KSL, see page 7.

Sliding hanger



Sliding hanger
mounted to Powerail-section.



Sliding hanger
mounted to Powerail-section.

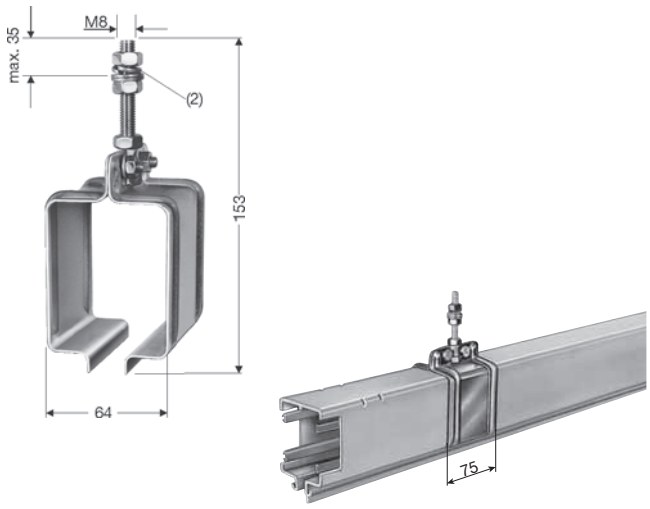
for KBSL only (one-piece bracket)

Type	Weight kg	Order-No.
KGB	0,225	259 001

for KBSL & KSL

Typ	Weight kg	Order-No.
KSH	0,251	252 894
KSH/K(1)	0,220	250 660

Fixpoint hanger



Fixpoint hanger mounted to Powerail section.
Hanger consists of steel clamp and bolt M 8.

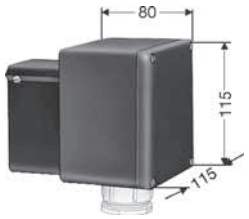
for KBSL & KSL

Typ	Weight kg	Order-No.
KF	0,215	258 806
KF/K(1)	0,215	258 807

(1) stainless steel
(2) Flat washers only be used in slotted holes.

End feeds

without powerail section



Cable gland M 32,
Cable-Ø 17 - 26 mm
for cable cross section max. 10 mm²

End feed comes loose without Powerail. It will be mounted at either end.

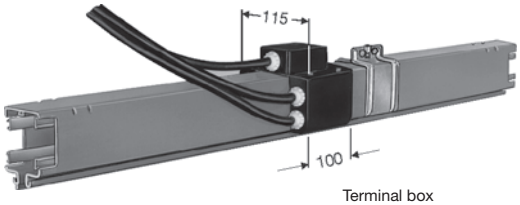
for KBSL & KSL

Type[2]	A	Weight kg	Order-No. Power line **HS** c/w PE	Order-No. Control line **SS** w/o PE
KEK 4/40-60	40-60	0,400	258 421	258 423
KEK 5/40-60	40-60	0,420	258 422	258 424

Line feeds[1]

with 2 m cables incl. 1 m section

A	Cable-Ø mm	Cable cross section mm²
40	9,5	6
60	11,5	10
100	13,5	25
140	14,5	35

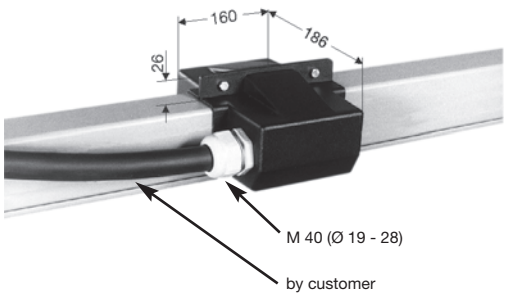


Terminal box
32 mm over Powerail

for KBSL & KSL

Type[2]	A	Weight kg	Order-No. Power line **HS** c/w PE	Order-No. Control line **SS** w/o PE
KNKL 4/ 40	40	4,000	259 209	259 205
KNKL 4/ 60	60	4,100	259 211	259 207
KNKL 4/100	100	6,300	259 213	–
KNKL 4/140	140	8,200	259 215	–
KNKL 5/ 40	40	4,400	259 221	259 217
KNKL 5/ 60	60	4,700	259 223	259 219
KNKL 5/100	100	7,400	259 225	–
KNKL 5/140	140	9,950	259 227	–

Joint feed



The joint feed KNS is without powerail.
It can only be used with KBSL and KSL 4 pole

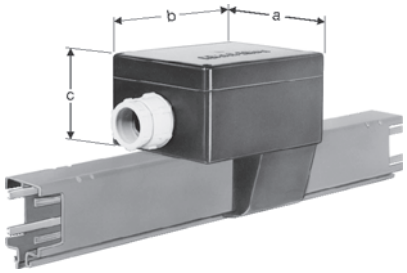
Type[2]	A	Weight kg	Order-No. Power line **HS** c/w PE	Order-No. Control line **SS** w/o PE
KNS 4/40-60	40-60	0,560	258 001	258 002

(1) The powerail section is part of the system length (see example of ordering page 20 & 21).

(2) For full type designation add suffix of Powerail section, e.g. KEK 4/60 w/ PE → KEK 4/60 **HS** Order-No. 258 421.

Line feed[1]

with terminal box incl. 1 m powerail section



Cable connections type HS

A	M	Cable-Ø mm	Nom.-connection-dia. mm²	Cable connection at
40	25	9 - 18	6	M8 (Type KNK: M6)
60	32	17 - 26	10	M8 (Type KNK: M6)
100	50	23 - 34	25	M8
140	50	23 - 34	35	M8
200	50	29 - 40	50	M10

All SS-types with PG 25

	KNK 40-60 A	KNKS 40-140 A	KNKS 200 A
a	115	156	206
b	115	196	286
c	70	100	140

for KBSL & KSL

Type[2]	A	Weight kg	Order-No. Power line **HS** c/w PE	Order-No. Control line **SS** w/o PE
KNK 4/ 40	40	2,464	258 254	258 256
KNK 4/ 60	60	2,600	258 258	258 260
KNK 5/ 40	40	2,631	258 262	258 264
KNK 5/ 60	60	2,800	258 250	258 252
KNKS 4/ 40	40	3,314	258 266	–
KNKS 4/ 60	60	3,450	258 268	–
KNKS 4/100	100	3,800	258 270	–
KNKS 4/140	140	4,100	258 272	–
KNKS 4/200	200	5,400	258 612	–
KNKS 5/ 40	40	3,581	258 274	–
KNKS 5/ 60	60	3,750	258 276	–
KNKS 5/100	100	4,150	258 278	–
KNKS 5/140	140	4,450	258 280	–
KNKS 5/200	200	5,800	258 616	–

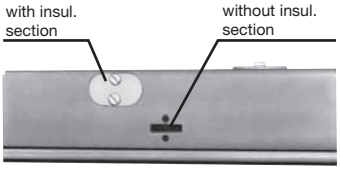
End caps

End cap assembled on Powerail

for KBSL & KSL

Type	Weight kg	Order-No.
MEK	0,086	256 527

Conductor dead sections



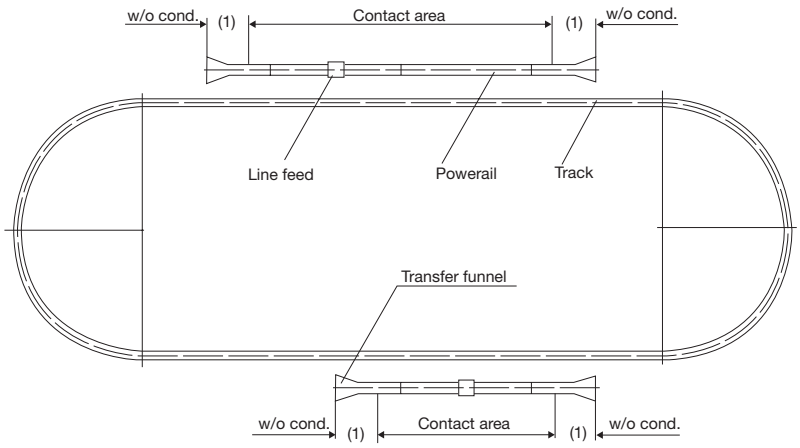
It is to be indicated, which copper rails are to be separated and which type of current collector is used (see page 5).
Installation factory-assembled.

for KBSL & KSL

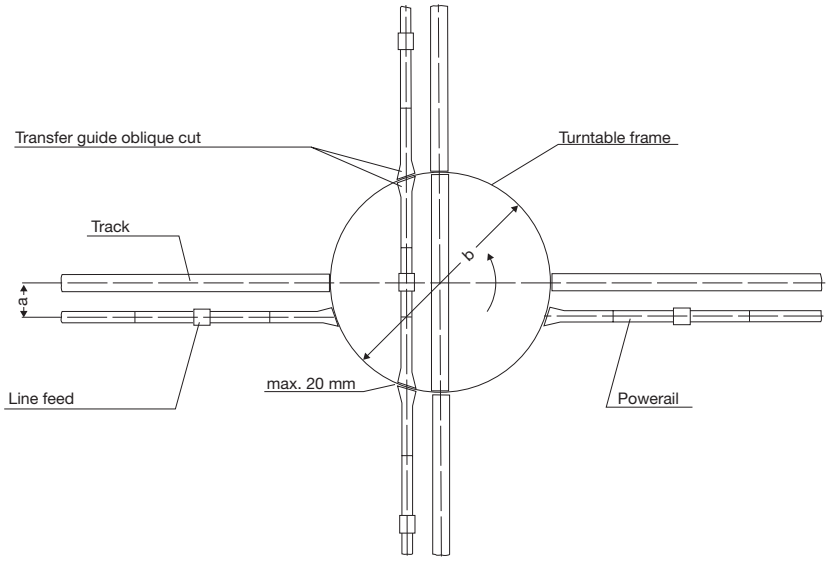
Type	with air gap 5 mm Order-No.	Type	with insul. section 30 mm Order-No.
STLA 1	251 860	**STLI 1**	250 220
STLA 2	251 870	**STLI 2**	250 590
STLA 3	251 880	**STLI 3**	250 600
STLA 4	251 890	**STLI 4**	250 610
STLA 5	251 900	**STLI 5**	250 620

[1] Above sections come factory assembled on a 1 m Powerail section (Please refer to ordering example on page 20).
[2] Suffix types e.g.. KNK 4/60 w/ PE → KNK 4/60 **HS** Order-No. 258 258.

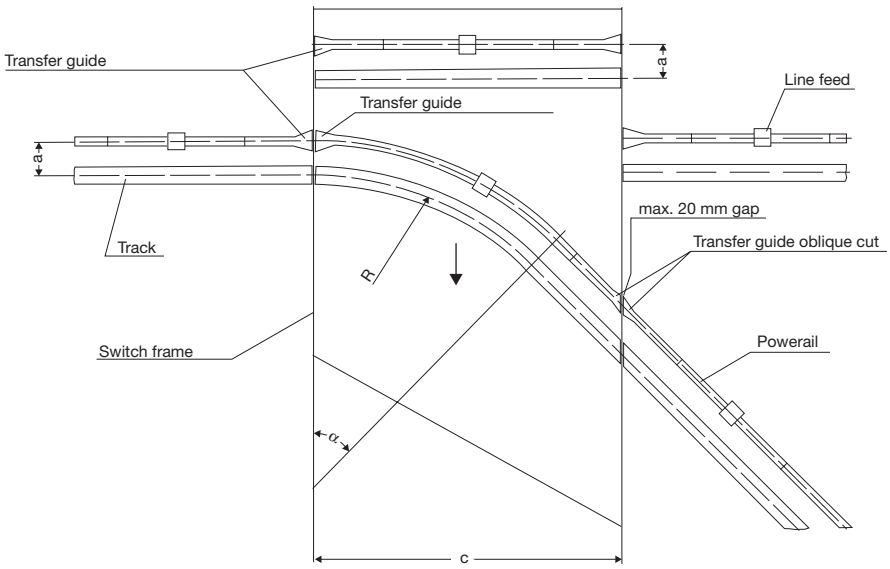
Contact section[1]



Turntable



Sliding switch



Max. 20 mm air gap between transfer guides.

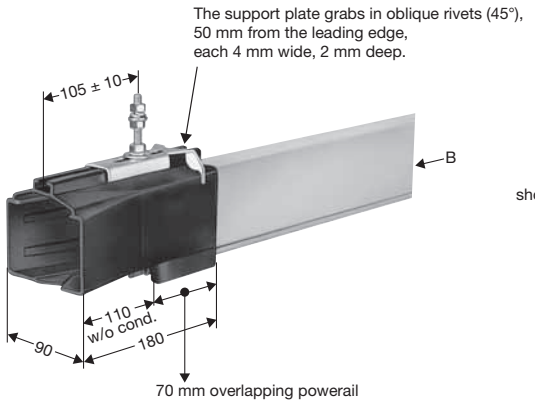
Please submit drawings of transfer applications. Specify dimensions a, b, c, R and angle α (α = max. 50°)

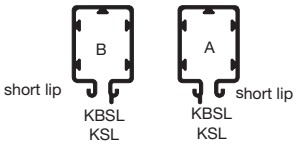
Please submit drawings for all transfer applications.

[1] Contact sections must not be activated before collectors are fully engaged.

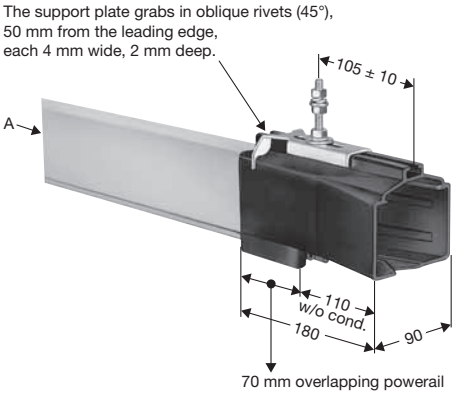
Transfer guides straight

Left hand version
incl. fixpoint hanger





Right hand version
incl. fixpoint hanger



4- & 5-poles, 40 to 200 A

Sketch shows left hand version (page 6) with Powerail section

Staggered arrangement of the transfer guides to each other:
horizontal max. 8 mm, vertical max. 3 mm

4- & 5-poles, 40 to 200 A

Sketch shows right hand version (page 6) with Powerail section

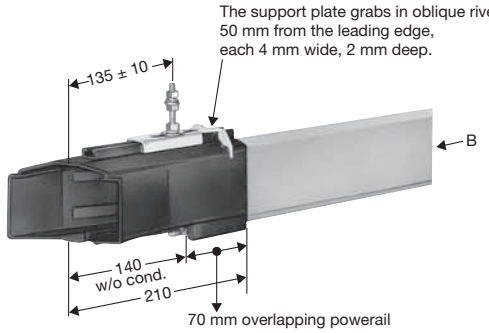
Staggered arrangement of the transfer guides to each other:
horizontal max. 8 mm, vertical max. 3 mm

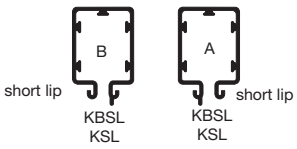
for KBSL & KSL

Type	Weight kg	Order-No.
AUN	0,340	257 455

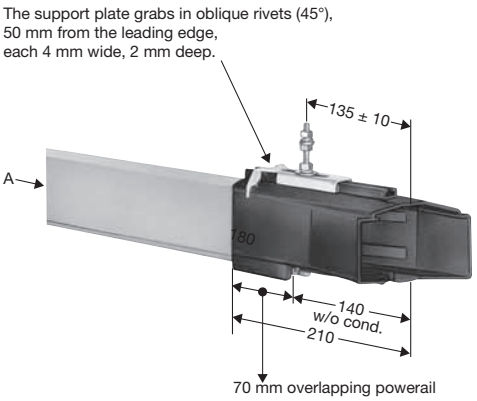
Transfer guides oblique

Left hand version
incl. fixpoint hanger





Right hand version
incl. fixpoint hanger



4- & 5-poles, 40 to 200 A

Sketch shows left hand version (page 6) with Powerail section

Staggered arrangement of the transfer guides to each other:
horizontal max. 8 mm, vertical max. 3 mm

4- & 5-poles, 40 to 200 A

Sketch shows right hand version (page 6) with Powerail section

Staggered arrangement of the transfer guides to each other:
horizontal max. 8 mm, vertical max. 3 mm

for KBSL & KSL

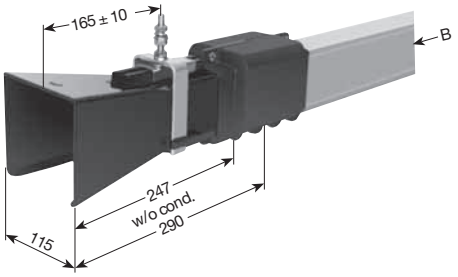
Typ	Gewicht kg	Bestell-Nr.
AUNS	0,380	257 459

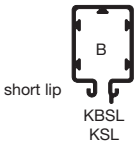
(1) With KBSL and KSL left and right execution, as well as control line are identically constructed.
Always use double collectors or two collectors for transfer applications (see page 18 and 19).

TRANSFER FUNNELS(1)

Left hand version

Offset:
horizontal max. 15 mm
vertical max. 10 mm



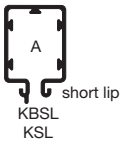


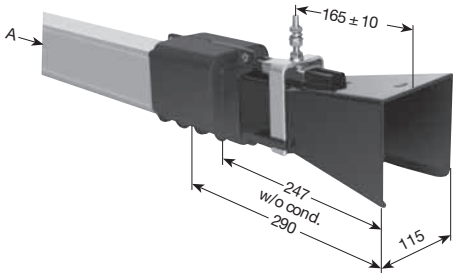
for KBSL & KSL

Type	Weight kg	Order-No. Power line **HS** c/w PE	Order-No. Control line **SS** w/o PE
ESTN 4 L	0,795	256 164	256 166
ESTN 5 L	0,800	256 172	256 174

Flexible support tow arms KFMLN are essential (see page 19).

Right hand version

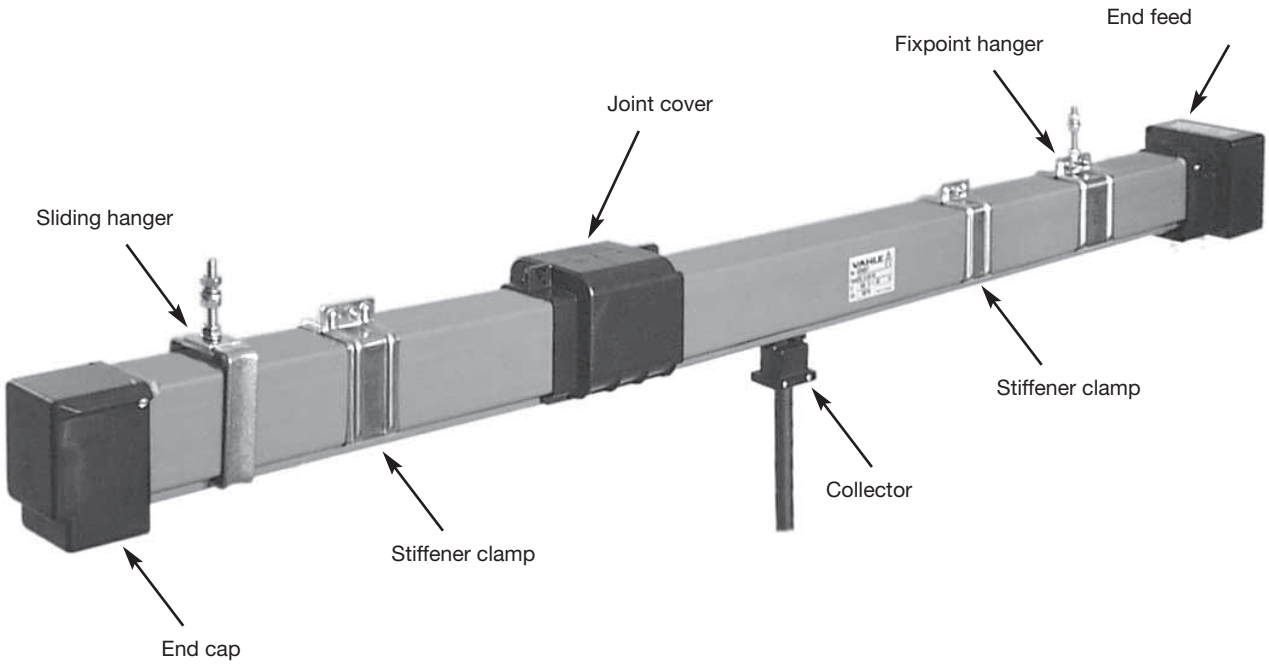




for KBSL & KSL

Type	Weight kg	Order-No. Power line **HS** c/w PE	Order-No. Control line **SS** w/o PE
ESTN 4 R	0,795	256 163	256 165
ESTN 5 R	0,800	256 171	256 173

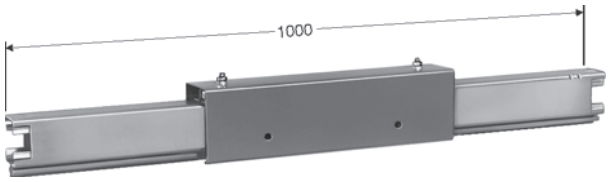
System picture



(1) Funnels must not be activated before collectors are fully engaged.
Suffix types e.g. ESTN 4 L with earth - > ESTN 4 L ref.no. 256 164.

ANTI-CONDENSATION SECTIONS[1]

incl. 1 m section



This anti-condensation-section consists of 1 m Powerail with openings covered by a protection hood. The anti-condensation section does not disconnect the powerail electrically.

Application of Anti-Condensation Section:

The anti-condensation section will be used where Powerails are passing from indoor to outdoor, preventing condensation of the outside mounted Powerail. The warm air from indoors can escape through the anti condensation section.

Feeding

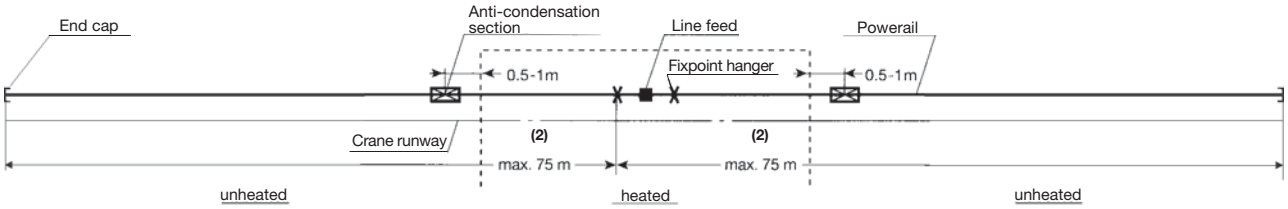
No extra feeds required as the Powerail is not interrupted.

Collectors

No extra collectors required.

Installation

The anti-condensation section is to be placed directly (0,5 m - 1 m max.) at the transfer point from heated to unheated part of the factory floor. See sketch.



for KBSL and KSL

Typ[3]	Order-No. Power line **HS** c/w PE	Order-No. Control line **SS** w/o PE
BTK 4/ 40	257 679	257 681
BTK 4/ 60	258 652	258 725
BTK 4/100	258 653	–
BTK 4/140	258 654	–
BTK 4/200	258 655	–
BTK 5/ 40	257 680	257 682
BTK 5/ 60	258 656	258 726
BTK 5/100	258 657	–
BTK 5/140	258 658	–
BTK 5/200	258 659	–

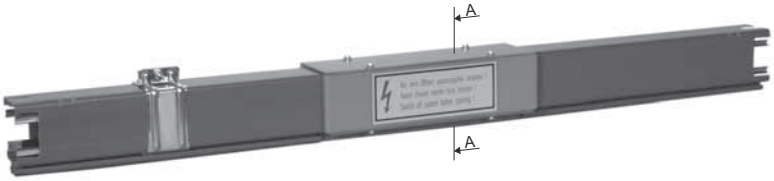
[1] Above sections come ready assembled on 1 m Powerail and are a part of the system length.

[2] For longer runs use Expansion joint section (see page 17).

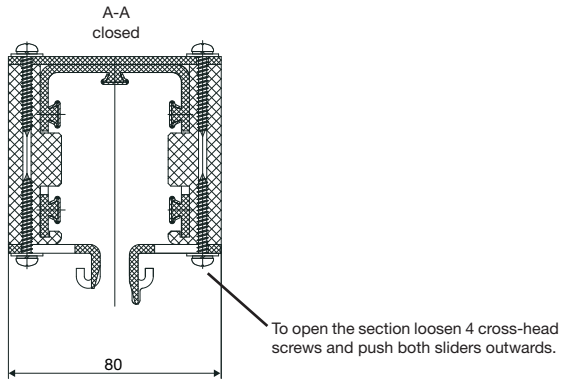
[3] Suffix types e.g. BTK 4/60 w/ PE → BTK 4 /60 **HS** Order-No. 258 652

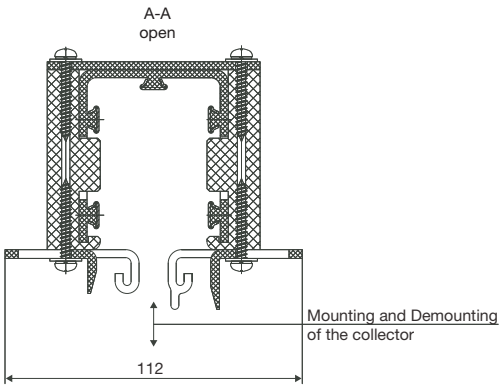
REMOVING SECTIONS[1]

incl. 1 m section



Assembly and disassembly of the collector is possible at the end of the track as well as at the removing section.
With plants with frequent maintenance procedures or several current collectors in a system (e.g. test plants)removing sections are to be planned.





By opening and closing the sliders at the bottom of the powerail housing the collector can be mounted and demounted easily.

Before opening disconnect mains.

The removing section does not disconnect the powerail electrically.

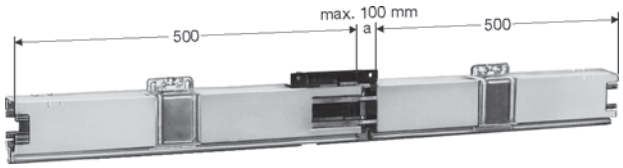
For single collectors

KBSL / KSL	
Type[2]	Order-No. Power line **HS** c/w PE
ATK 4/ 40	257 988
ATK 4/ 60	252 811
ATK 4/100	252 812
ATK 4/140	252 813
ATK 4/200	252 814
ATK 5/ 40	257 990
ATK 5/ 60	252 816
ATK 5/100	252 817
ATK 5/140	252 818
ATK 5/200	252 819
Typ[2]	Order-No. Control line. **SS** w/o PE
ATK 4/ 40	257 989
ATK 4/ 60	252 815
ATK 5/ 40	257 991
ATK 5/ 60	252 820

For double collectors

KBSL / KSL	
Typ[2]	Order-No. Power line **HS** c/w PE
ATKD 4/ 40	257 992
ATKD 4/ 60	252 831
ATKD 4/100	252 832
ATKD 4/140	252 833
ATKD 4/200	252 834
ATKD 5/ 40	257 994
ATKD 5/ 60	252 836
ATKD 5/100	252 837
ATKD 5/140	252 838
ATKD 5/200	252 839
Typ[2]	Order-No. Control line. **SS** w/o PE
ATKD 4/ 40	257 993
ATKD 4/ 60	252 835
ATKD 5/ 40	257 995
ATKD 5/ 60	252 840

[1] Above sections come ready assembled on 1 m Powerail and are a part
[2] Suffix types e.g. ATK 4/40 w/ PE → ATK 4 /40 **HS** Order-No. 257 988.



KBSL / KSL	
Typ(2)	Order-No. Power line **HS** c/w PE
DVK 4/ 40	257 054
DVK 4/ 60	252 430
DVK 4/100	252 440
DVK 4/140	252 450
DVK 4/200	250 249
DVK 5/ 40	257 687
DVK 5/ 60	252 470
DVK 5/100	252 480
DVK 5/140	252 490
DVK 5/200	250 250
Typ(2)	Order-No. Control line **SS** w/o PE
DVK 4/ 40	257 688
DVK 4/ 60	252 460
DVK 5/ 40	257 689
DVK 5/ 60	252 500

Expansion joint sections are required to compensate expansions and contractions of KSL Powerail in varying termperatures without interrupting electrical power.

The expansion joints are used if the powerail length between two curves, switches or other fix points is exceeding 20 m (10 m at high temperature fluctuation) , or corresponding to a temperature difference t of.

Δ t 20° C = 100 m
Δ t 30° C = 68 m
Δ t 40° C = 50 m
Δ t 60° C = 34 m
Δ t 80° C = 25 m

Adjacent sketches, Fig. 1 and Fig. 2 show this type of application. Longer runs or a higher difference in temperature require several expansion joints or the telescope sections. When in doubt please consult the factory.

For arrangements of the fixpoints refer to sketch 1-3.
The remaining conductor sections **have to be** arranged in sliding hangers.

Feeding

Expansion joints do not interrupt electrical power, so there is no need for an extra feeding. Expansion joints do not influence the voltage drop of a system.

Current collector

No special or extra collector required.

Mounting

The expansion joint section is installed on sliding hangers in the center between two fix points.
The gap dimensions «a» depends on the ambient temperature during installation. See adjacent diagram and example.

Example: Temperature18 °C «a» = 50 mm

Fig. 1

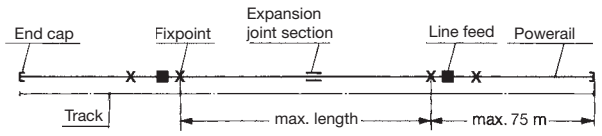


Fig. 2

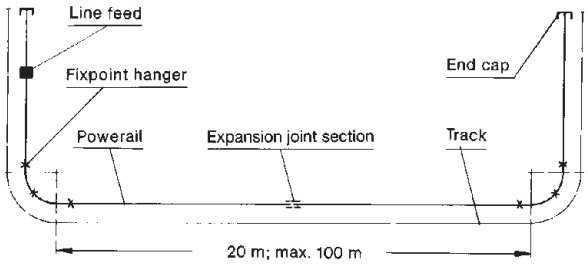
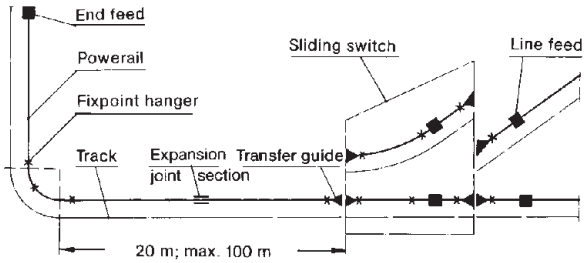
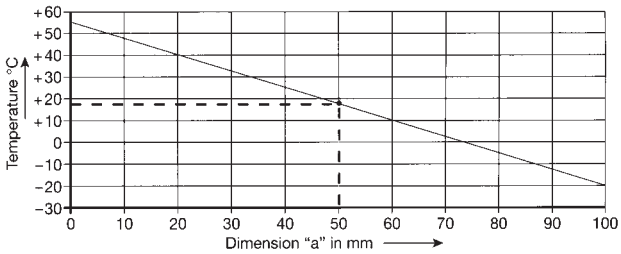


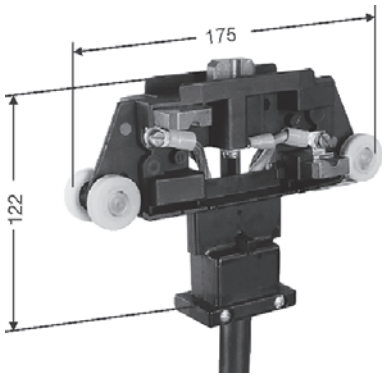
Fig. 3



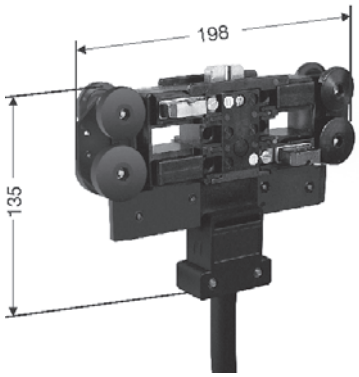
Extension diagram to the expansion section



(1) Above sections come ready assembled on 1 m Powerail and are a part of the system length.
(2) Suffix types e.g. DVK 4/60 w/ PE → DVK 4 /60 **HS** Order-No. 252 430.



SKR, 5-pole



SKN, 5-pole

Type[3]	A[1]	Order-No. Power line **HS** c/w PE	Type[3]	A[1]	Order-No. Control line **ST** w/o PE	Poles	Weight kg	Max.speed m/min. Normal	Max.speed m/min. Transfer	General
KBSL & KSL										
SKR 4/25-1	25	256 773	**SKR 4/25-1**	25	255 928	4	0,485	100	–	for straight runs and curves R > 0.6 m/with ball bearing wheels **Not** to be used for transfer guides and transfer funnels
SKR 5/25-1	25	257 690	**SKR 5/25-1**	25	255 931	5	0,572	100	–	
SKR 4/40-1	40	255 926	–	–	–	–	0,665	100	–	
SKR 5/40-1	40	255 929	–	–	–	–	0,795	100	–	
SKN 4/40-1	40	257 130	**SKN 4/25-1**	25	257 170	4	0,915	180	80	for straight runs and curves R > 1.2 m/with ball wearing wheels
SKN 5/40-1	40	257 140	**SKN 5/25-1**	25	257 180	5	1,045	180	80	
SKN 4/40 K-1	40	257 150	**SKN 4/25 K-1**	25	257 190	4	0,885	180	80	for curved runs R 0.6-1.2 m/with ball bearing wheels
SKN 5/40 K-1	40	257 160	**SKN 5/25 K-1**	25	257 200	5	1,035	180	80	

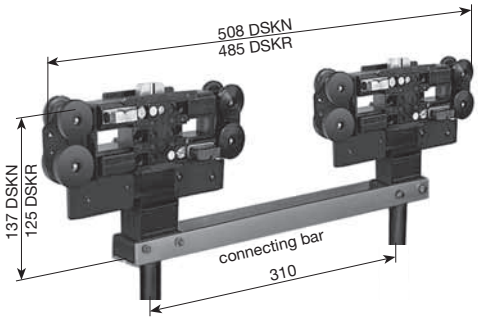


Illustration shows DSKN, 5-pole, type S

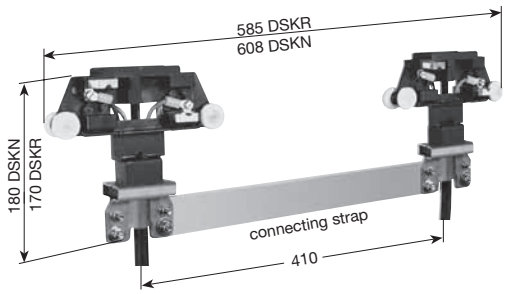


Illustration shows DSKR, 5-pole, type F

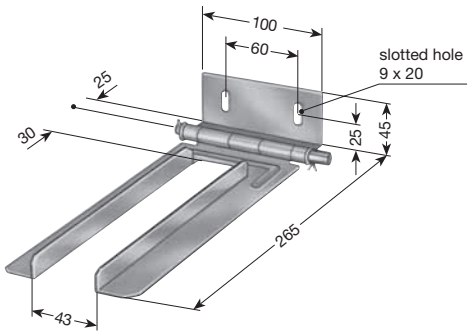
F = flexible strap connection for curves[2]
S = rigid bar connection for straight runs

Type[3]	A[1]	Order-No. Power line **HS** c/w PE	Type[3]	A[1]	Order-No. Control line **ST** w/o PE	Poles	Weight kg
KBSLund KSL							
DSKR 4/50 F-1	50	257 691	**DSKR 4/50 F-1**	50	256 485	4	1,430
DSKR 5/50 F-1	50	257 692	**DSKR 5/50 F-1**	50	256 491	5	1,600
DSKR 4/50 S-1	50	257 693	**DSKR 4/50 S-1**	50	256 371	4	1,210
DSKR 5/50 S-1	50	257 694	**DSKR 5/50 S-1**	50	256 372	5	1,384
DSKR 4/80 F-1	80	256 473	–	–	–	4	1,790
DSKR 5/80 F-1	80	256 479	–	–	–	5	2,050
DSKR 4/80 S-1	80	255 944	–	–	–	4	1,570
DSKR 5/80 S-1	80	256 370	–	–	–	5	1,830
DSKN 4/80 F-1	80	257 780	**DSKN 4/50 F-1**	50	257 880	4	2,230
DSKN 5/80 F-1	80	257 790	**DSKN 5/50 F-1**	50	257 890	5	2,550
DSKN 4/80 S-1	80	258 385	**DSKN 4/50 S-1**	50	258 386	4	1,900
DSKN 5/80 S-1	80	258 387	**DSKN 5/50 S-1**	50	258 388	5	2,200

Trolley connecting cable 1 m long. Longer cable available. Copper cross section 2.5 mm² per core for 25 A and 4 mm² for 40 A. Longer cable available.
Collectors for higher speed and cleaning trolleys on request.

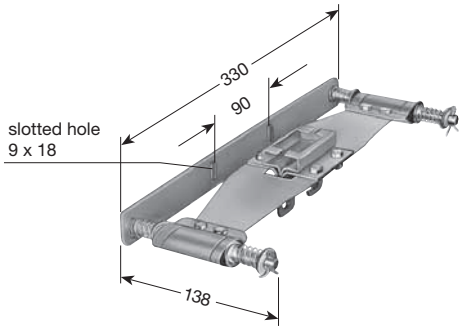
(1) All ampere data for 60%intermittent duty. For the Powerail types KBSL/KSL with CU-Inox conductors consider half of the electrical ampere load.
(2) Do not use double collectors, but 2 singles for curves with less than 1,2 m radius and for transfer guides more than 45°oblique cut (see page 12).
(3) For full Type designation add Power or Control, suffix e.g. SKR 4/25-1 w/ PE → SKR 4/25-1 **HS** Order-No. 256 773
SKR 4/25-1 w/o PE → SKR 4/25-1 **ST** Order-No. 255 928.

for single & double collector[2]
Mounting dimensions see page 8



Type	Weight kg	Order-No.
KWS	0,480	250 380
KWS/K[1]	0,480	252 340

flexible support type, with single collector
for transfer funnels (see page 14)
Mounting dimensions see page 24



If you are going to use the flexible towing arm in system with curves please contact us.

Type	Weight kg	Order-No. for all types
KFMLN für SKN	1,170	259 506

Spare parts

Powerail	**Type**	**KBSL**	**KSL**
		Order-No.	Order-No.
Joint cap, 150 mm for plug-in joint and bolted joint		257 921	257 921
Stiffener clamp, 50 mm		–	258 797
Stiffener clamp of stainless steel		–	258 812
Bolted joint splice w/hardware plug in joint, max. 100 A		259 274	259 274
Bolted joint 40 - 200 A		258 796	258 796
Adapter for new/old style Powerail (for old KSL)		258 822	258 822

		KBSL & KSL	
Collector	**Type**	**SKR**	**SKN(K)**
		Order-No.	Order-No.
Carbon brush phase, incl. brush holder (lateral)		257 600	254 890
Carbon brush upper fifth pole, incl. brush holder		257 600	254 891
Carbon brush ground , incl. brush holder (lateral)		257 601	254 892
Carbon pressure spring, standard (ca. 5 N)		258 758	258 757
Carbon pressure spring, reinforced (ca. 8,5 N)		258 761	258 760
Throat part, straigth runs (SKN)		–	254 893
Throat part, for curves (SKN/K)		–	254 894
Glider plate		–	–
Trolley wheel (below)		–	254 895
Guide roller (above)		–	254 903
Connecting strap for double collectors		258 379	258 379
Connecting bar for double colectors		258 430	258 431
Attachment clamp KWZL		–	254 897
Attachment clamp KWZ		250 310	–
Cleaning brushes complet set (2 pieces)		–	252 851

[1] Stainless steel
[2] In case of installing 2 Powerail systems in parallel use one towing arm each per collector unit.

EXAMPLES FOR ORDERING

Runway Electrification – 40 m

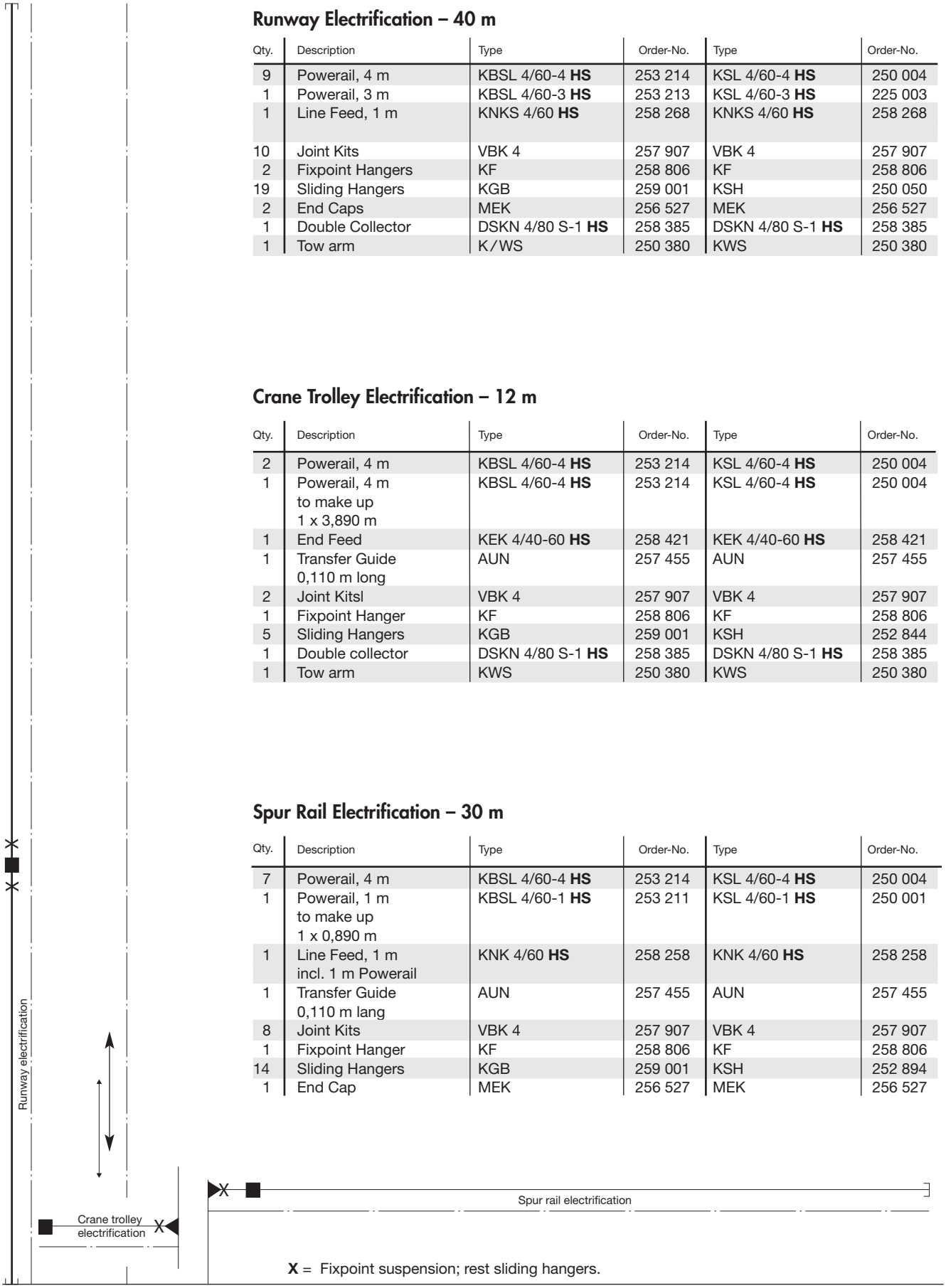
Qty.	Description	Type	Order-No.	Type	Order-No.
9	Powerail, 4 m	KBSL 4/60-4 **HS**	253 214	KSL 4/60-4 **HS**	250 004
1	Powerail, 3 m	KBSL 4/60-3 **HS**	253 213	KSL 4/60-3 **HS**	225 003
1	Line Feed, 1 m	KNKS 4/60 **HS**	258 268	KNKS 4/60 **HS**	258 268
10	Joint Kits	VBK 4	257 907	VBK 4	257 907
2	Fixpoint Hangers	KF	258 806	KF	258 806
19	Sliding Hangers	KGB	259 001	KSH	250 050
2	End Caps	MEK	256 527	MEK	256 527
1	Double Collector	DSKN 4/80 S-1 **HS**	258 385	DSKN 4/80 S-1 **HS**	258 385
1	Tow arm	K/WS	250 380	KWS	250 380

Crane Trolley Electrification – 12 m

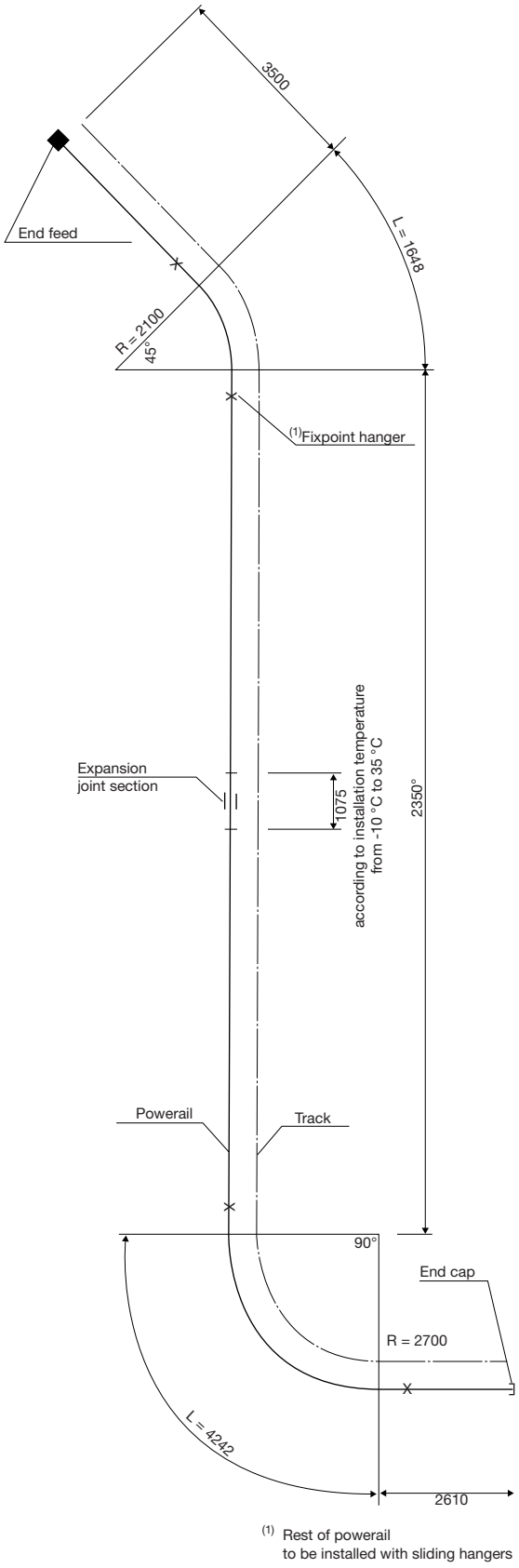
Qty.	Description	Type	Order-No.	Type	Order-No.
2	Powerail, 4 m	KBSL 4/60-4 **HS**	253 214	KSL 4/60-4 **HS**	250 004
1	Powerail, 4 m to make up 1 x 3,890 m	KBSL 4/60-4 **HS**	253 214	KSL 4/60-4 **HS**	250 004
1	End Feed	KEK 4/40-60 **HS**	258 421	KEK 4/40-60 **HS**	258 421
1	Transfer Guide 0,110 m long	AUN	257 455	AUN	257 455
2	Joint Kitsl	VBK 4	257 907	VBK 4	257 907
1	Fixpoint Hanger	KF	258 806	KF	258 806
5	Sliding Hangers	KGB	259 001	KSH	252 844
1	Double collector	DSKN 4/80 S-1 **HS**	258 385	DSKN 4/80 S-1 **HS**	258 385
1	Tow arm	KWS	250 380	KWS	250 380

Spur Rail Electrification – 30 m

Qty.	Description	Type	Order-No.	Type	Order-No.
7	Powerail, 4 m	KBSL 4/60-4 **HS**	253 214	KSL 4/60-4 **HS**	250 004
1	Powerail, 1 m to make up 1 x 0,890 m	KBSL 4/60-1 **HS**	253 211	KSL 4/60-1 **HS**	250 001
1	Line Feed, 1 m incl. 1 m Powerail	KNK 4/60 **HS**	258 258	KNK 4/60 **HS**	258 258
1	Transfer Guide 0,110 m lang	AUN	257 455	AUN	257 455
8	Joint Kits	VBK 4	257 907	VBK 4	257 907
1	Fixpoint Hanger	KF	258 806	KF	258 806
14	Sliding Hangers	KGB	259 001	KSH	252 894
1	End Cap	MEK	256 527	MEK	256 527



X = Fixpoint suspension; rest sliding hangers.



(1) Rest of powerail
to be installed with sliding hangers

35,5 m Powerail KSL 5/60 consisting of:

Qty.	Description	Type	Order-No.
5	Powerail, 4 m	KSL 5/60-4 **HS**	250 024
1	Powerail, 4 m to make up 1 x 3500 mm	KSL 5/60-4 **HS**	250 024
2	Powerail, 3 m to make up 1 x 2610 mm and. 1 x 2500 mm	KSL 5/60-3 **HS**	250 023
1	Powerail, 2 m for horizontal curve 45°, R = 2100 mm, L = 1648 mm, LLA	KSL 5/60-2 **HS**	250 022
2	Power. 3 m to make up horizontal curve 2 x 45°, R = 2700 mm, L = 2121 mm, LLI	KSL 5/60-3 **HS**	250 023
3	Surcharge for bending, horizontal		251 500
1	End Feed	KEK 5/40-60 **HS**	258 422
1	Expansion Joint	DVK 5/60 **HS**	252 470
11	Joint Kits	VBK 5	257 908
4	Fixpoint Hangers	KF	258 806
18	Sliding Hangers	KSH	252 894
1	End Cap	MEK	256 527
1	Collector	SKN 5/40-1 **HS**	257 140
1	Tow arm	KWS	250 380

KTW-SYSTEM WITH KBSL

Power supply with support rail for moving machinery

like drilling machines, grinders, screw drivers etc. along assembly lines or above work benches in any type of plant.

No power cables on the floor to cause accidents and no obstruction to personnel by trailing cables.

Containers or baskets carrying bolts and nuts or other hardware for the assembling work can also be supported from and pushed along the carrier rail.

General

The KTW-System consists of a galvanized C-track taking the carrier trolleys or other hook-up elements and the Enclosed Powerail for power supply.
The support carrier is supplied with an attachment plate. Electrical plugs, fuses etc. can be fixed to the plate as per customers` requirements.The carrier is mecanically connected to the collector by a hinge and moved manually. C-track and Powerail are fixed to a support angle.

Powerail

Types KBSL (40-200A) are used as power supply with appropriate collector (max. 40 A).

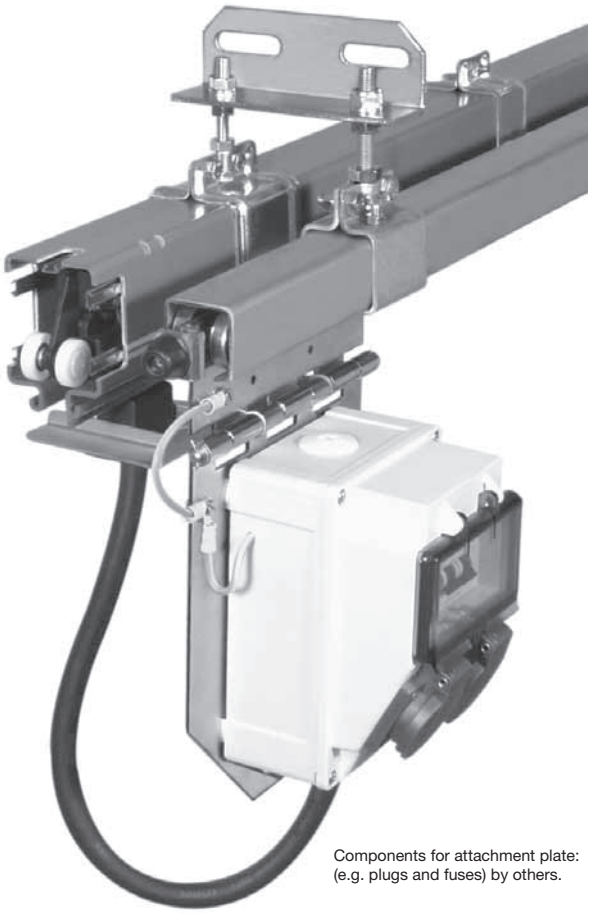
Support rail

corresponds to C-track, cat. 8a, page 2, galvanized.

Support distance

depends on mecanical stress. The max. support distance is 2 m considering a load capacity of 50 kg between hangers. For higher loads the support distance must be reduced correspondingly.

Other combinations are possible, refer to cat. 4d (LSV) or 3b (VKL).



Components for attachment plate: (e.g. plugs and fuses) by others.

Engineering Data:

Powerail KBSL

40 A	(100% DF) copper conductor 10 mm²
60 A	(100% DF) copper conductor 15 mm²
100 A	(100% DF) copper conductor 25 mm²
140 A	(100% DF) copper conductor 35 mm²
200 A	(80% DF) copper conductor 50 mm²

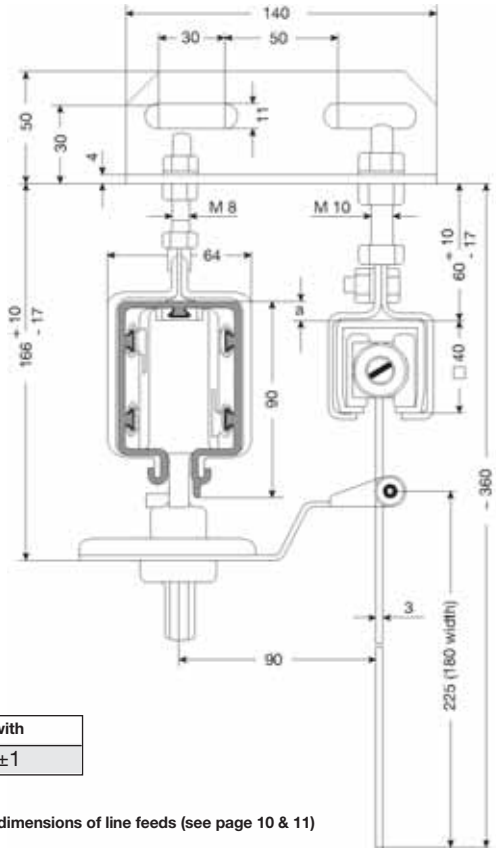
Voltage rating:	up to 690 V
No. of conductors:	4 & 5
Std. sections:	4 m and short sections
Support distance:	variable up to 2 m
Temperature resistance:	–30 °C/+60 °C
Collector rating:	40 A & multiple (60% DF)
Weight:	1.65 up to 3.35 kg/m (see page 5)

C-track ⊓ S 2

Section modulus Wx:	3.1 cm³
Moment of inertia:	6.7 cm⁴
Material:	Galvanized steel
Std. sections:	6 m and short sections
Support distance:	variable up to 2 m
Weight:	2.5 kg/m

Carrrier Trolley

Carrying capacity:	up to 50 kg
Weight:	approx. 1.5 kg



KTW-Systems with	
Dim a	10±1

Please consider dimensions of line feeds (see page 10 & 11)

Bill of Material

Ampere capacity A	KTW Systems with Powerail - HS c/w PE KBSL 4 Type[2]	Weight kg/m	Order-No.	KBSL 5 Type[2]	Weight kg/m	Order-No.
	KTW-Systems					
40	**KTW 4/ 40**	4,926	270 607	**KTW 5/ 40**	5,050	270 608
60	**KTW 4/ 60**	4,960	270 000	**KTW 5/ 60**	5,090	270 020
100	**KTW 4/100**	5,350	270 010	**KTW 5/100**	5,580	270 030
140	**KTW 4/140**	5,640	270 040	**KTW 5/140**	5,860	270 280
200	**KTW 4/200**	6,240	270 050	**KTW 5/200**	6,460	270 070
	End feed					
40-60	**KEK4/40-60**	0,400	258 421	**KEK 5/40-60**	0,400	258 422
	Line feeds[1]					
40	**KNK 4/ 40**	2,464	258 255	**KNK 5/ 40**	2,631	258 263
60	**KNK 4/ 60**	2,600	258 259	**KNK 5/ 60**	2,800	258 251
100	**KNKS 4/100**	3,800	258 271	**KNKS 5/100**	4,150	258 279
140	**KNKS 4/140**	4,100	258 273	**KNKS 5/140**	4,450	259 130
200	**KNKS 4/200**	5,400	254 080	**KNKS 5/200**	5,800	254 090
	Collector SKR with carrier trolley & tow arm					
40	**STW 4/40**	2,380	270 080	**STW 5/40**	2,480	270 100
40	**STWL 4/40**	2,480	270 610	**STWL 5/40**	2,540	270 611

STWL is specially suitable for systems with side pull.

Spare Parts List

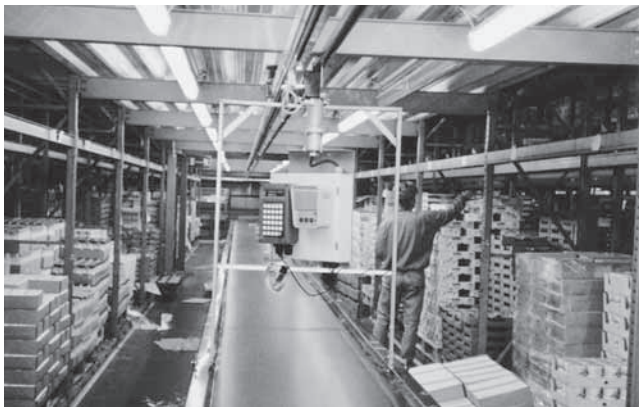
Description	Type	Weight kg/m	Order-No.	Description	Type	Weight kg/m	Order-No.
C-track	**S 2**	2,490	316 634	Fixpoint for C-track (2 pieces)	**FBS 2**	0,380	315 150
Joint	**VS 2**	0,680	315 050	Sliding Hanger for C-track	**ABS 2**	0,370	315 140
End cap for track	**K 40**	0,009	316 449	Carrier trolley w/attachment plate (short)	**TW**	1,700	270 190
Bumper	**PS 2**	0,150	317 000	Carrier trolley w/attachment plate (long)	**TWL**	1,800	270 609
Mounting bracket	**TK**	0,350	270 130	Tow arm for STW	**TMN**	0,180	270 313

Spare parts list for Powerail KBSL see page 20.
TWL specially suited for systems with side pull.

Example for Ordering

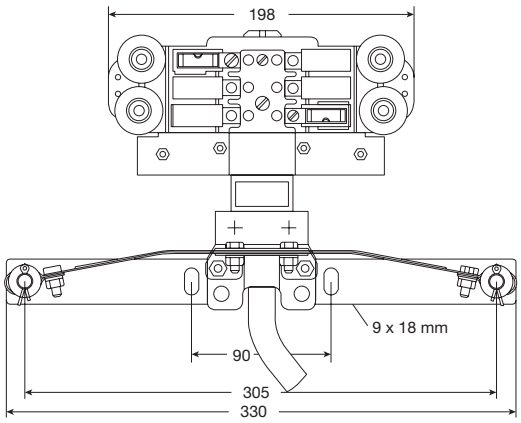
	Type	Order-No.
100 m KTW-System 4pole	**KTW 4/100 HS**	270 010
1 Line Feed 4pole	**KNKS 4/100 HS**	258 271
20 Collectors c/w carrier trolleys	**STW 4/ 40 HS**	270 080


KTW-System in production line

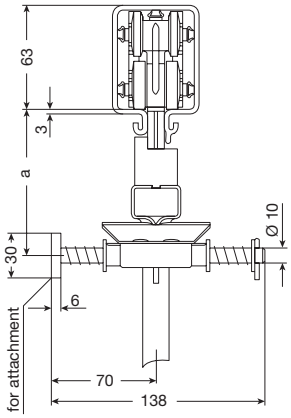

KTW-System for storage/retrieval installations

[1] The Powerail section for the line feed ist part of the system lenght.
[2] For full type designation add suffix of powerail section see example for ording.

FLEXIBLE TOW ARM CONFIGURATIONS

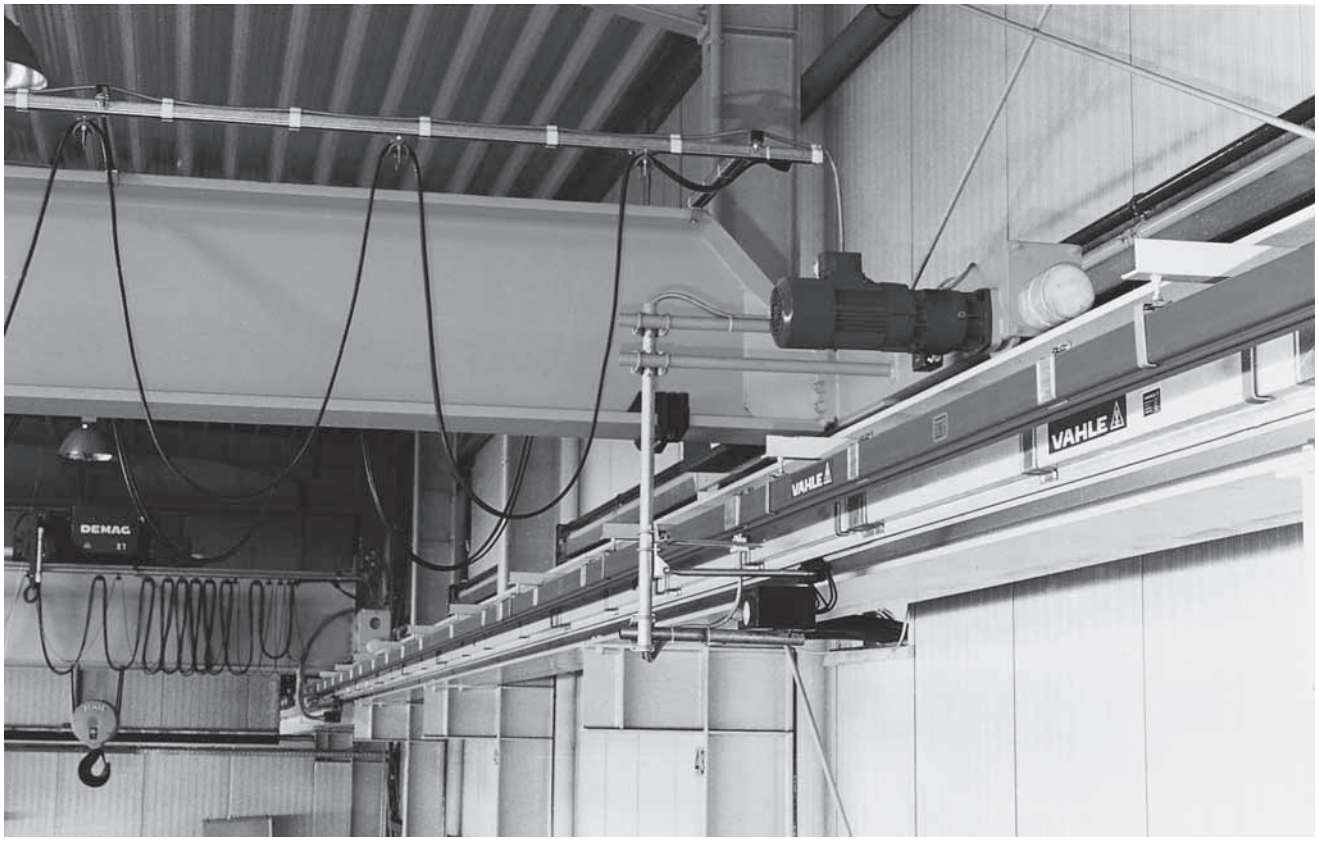


max. horizontal offset 15 mm
max. vertical offset 10 mm



Flexible tow arm KFML with collector SKN

for Collector	SKN
Dim. a(1)	95



Powerail for the current supply of a hangar crane.

(1) Adjust standard gauge during installation.

QUESTIONNAIRE

Company: _____ Date: _____

_____ _____

Tel: _____ Fax: _____

E-Mail: _____ Internet: (URL) _____

1. Number of powerail installations: _____

2. Type of equipment to be powered: _____

3. Operating voltage: _____ Volts, Phases: _____, Frequency: _____ Hz
   Three phase voltage: ☐ AC voltage: ☐ DC voltage: ☐

4. Track length: _____

5. Number of conductors: _____ (Neutral: _____ control: _____ ground: _____)

6. Mounted position of powerail:

   ☐ Powerail pendant, collector cable facing to the bottom
   ☐ Powerail pendant, collector cable lateral payout (1)
   ☐ Support distance _____ m (max. 2 m)
   ☐ Other: _____

7. Number of consumers per system: _____

8. Indoor: ☐ Outdoor: ☐

9. Other operating conditions (humidity, dust, chemical influence etc.)
   _____

10. Ambient temperature: _____ °C min. _____ °C max.

11. Position and number of feeding points(1): _____

12. How will the conductor system be arranged?(1) _____

13. Brackets required: yes ☐ no ☐ c/c distance beam / powerail _____
    Flange width of beam _____

14. Position and number of isolating sections (e.g. for maintenance): _____

15. Travel speed: _____ in curves: _____ at transfers: _____

16. Power consumption of the individual consumer loads: _____
    (Please consult table on reverse side)

17. Max. Voltage drop from the powerail feed point to the consumer considering starting current:
    3% ☐ or _____ % ☐ referring to nominal voltage

Remarks: _____

(1) For curved tracks, powerail with isolating sections etc., we require sketches to enable us to prepare a quotation. pto!

Please copy and fill in the questionnaire.

QUESTIONNAIRE

To the nearest local VAHLE agency: Date:

Motor data	Crane 1							Crane 2						
	Power kW	Nominal current A	Nominal current cos φ_N	Nominal current % ED	Starting current A	Starting current cos φ_A	Type of Motors[1]	Power KW	Nominal current A	Nominal current cos φ_N	Nominal current % ED	Starting current A	Starting current cos φ_A	Type of Motors[1]
Hoist motors														
Auxiliary hoist														
Long travel														
Cross travel														

Motor data	Crane 3							Crane 4						
	Power kW	Nominal current A	Nominal current cos φ_N	Nominal current % ED	Starting current A	Starting current cos φ_A	Type of Motors [1]	Power KW	Nominal current A	Nominal current cos φ_N	Nominal current % ED	Starting current A	Starting current cos φ_A	Type of Motors[1]
Hoist motors														
Auxiliary hoist														
Long travel														
Cross travel														

Mark with * those motors which can run simultaneously.
Mark with Δ those motors which can start up simultaneously.

[1]Use:
K for squirrel cage motor
S for slipring motor
F for frequency controlled motor

Further remarks: _____

_____

_____

_____

Signature: _____

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W1100121/00/en | Rev.01 | 03/24 | Errors and technical modifications subject to change.